

**Manitoba Conservation
Forest Practices
Guidebook**

PRE-HARVEST SURVEYS

Valid until January 2008

Manitoba Conservation Forest Practices Guidebook

PRE-HARVEST SURVEYS

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<http://www.gov.mb.ca/conservation/forestry/forest-practices/fpp-contents.html>

PREFACE

MANITOBA FOREST PRACTICES

This guidebook has been developed as part of the Forest Practices initiative of Manitoba Conservation. The Forest Practice initiative of Manitoba Conservation, led by the Forestry Branch, is intended to provide consistent operational direction for resource managers, timber operators, natural resource officers, and auditors to conduct or assess forestry activities.

One of the primary goals of the Forest Practice initiative is to advance "best" practices through guidelines and standards for sustainable forest management activities in Manitoba. Guidelines present alternative procedures or standards that can be applied to satisfy the principle upon which the guidelines are based. Specific guidelines are enforceable when identified on Work Permits. Forest Practice Guidebooks ensure all forest resource values are appropriately addressed during the full range of forest activities.

Forest Practices Guidebooks are one of several references available to resource managers, timber operators, natural resource officers, and auditors. References include provincial guidelines as well as Forest Management Plans, Annual Operating Plans and Standard Operating Procedures developed by each forest company.

Representatives from several branches of Manitoba Conservation (Forestry, Wildlife and Ecosystems Protection, Fisheries, Environmental Approvals, Parks and Natural Areas, etc.), the three major Forest Management Licencees in Manitoba (Tembec Industries Inc., LP Canada Ltd., Tolko Industries Ltd.), and the Forest Industry Association of Manitoba, representing timber quota holders, cooperated in a consensus seeking manner to develop Forest Practice Guidebooks. Regional specialists participated when meetings were held in their respective regions.

All guidelines for a specific forest practice will be contained in a single guidebook. Each guidebook will also contain pertinent references to science, legislation, policy, agreements, and licences. Recommendations for the planning, implementation, monitoring, and enforcement of the specific forest practice in question will be included.

As much as possible the recommendations within each Forest Practice Guidebook will:

- be based on scientific evidence
- be measurable
- be practical
- be flexible and applicable in a variety of ecological conditions
- be clearly presented to enable consistent interpretation and application
- contain accepted terminology and definitions
- be reviewed and amended as required

The guidebooks are available for public comment on the Forestry Branch web site at: www.gov.mb.ca/conservation/forestry/forest-practices/fpp-contents.html

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Table 1. Minimum number of pre-harvest plots to be established.

PRE-HARVEST SURVEYS

PURPOSE

The purpose of this document is to provide operational guidelines for the collection of information on forest values and other related values during pre-harvest surveys (PHS) within proposed blocks. The information collected during pre-harvest surveys will be used to develop block summary forms that contain site specific harvest and forest renewal prescriptions for Annual Operating Plans (AOP). The recommendations and requirements contained in this document will be used by Forest Management Licencees and others responsible for the planning of harvest activities in Manitoba.

BACKGROUND

Pre-harvest surveys are considered an important component of sustainable forest management and are a requirement of recent Environment Act Licences issued by Manitoba Conservation to Forest Management Licencees.

During the forest management planning process blocks are identified which must be investigated in order to confirm timber resources and identify non-timber values. Each block, and when required the area within 100 metres of the proposed block boundaries, will be assessed to mitigate impacts of forest management activities on sensitive sites, waterways, wetlands, wildlife travel corridors, and wildlife habitat.

Data from pre-harvest surveys is summarized and incorporated on block summary forms. Block summary forms accompany each proposed cut block in Annual Operating Plans. Many sources of other information also contribute to plans and prescriptions. Aerial photographs, topographic maps, other surveys, personal experience and information provided by Manitoba Conservation are regularly used. While pre-harvest surveys themselves do not include direct recommendations for site specific prescriptions, all the information listed above is used by forest planners to help develop site specific prescriptions. Survey results should be included where appropriate in block summary forms.

The information on timber and other resource values collected during pre-harvest surveys will be used to develop harvest and renewal prescriptions that:

- maintain site productivity
- reduce resource use conflict
- mitigate potential negative impacts
- make operations more efficient/effective
- conserve biodiversity
- contribute to sustainable forest management

Information collected during pre-harvest surveys may also enhance or correct existing resource information and enable comparisons of pre and post harvest conditions. Not all information collected during pre-harvest surveys will be presented in block summary forms. Some information collected during pre-harvest surveys may be inconsequential and will not warrant presentation, while sensitive information such as archeological finds will not be made public. At this time data collected during pre-harvest surveys are not necessarily considered a source of baseline data for research or long term monitoring. Future changes to standardize methods may help provide baseline data for research and monitoring. Pre-harvest survey methods are of a general nature and may not meet research data collection requirements.

TIMING

Pre-harvest surveys should be performed prior to including a block in an Annual Operating Plan. Surveys should be conducted between May and September to capture information during a range of seasons and migration times. Local knowledge and information should be used to determine times and locations. Some blocks located in wet, remote areas can not be efficiently surveyed during this period. These sites could be surveyed in early spring or late fall in the absence of snow when the sites are still relatively accessible.

DESIGN AND METHODS

Each proposed block should be subdivided to identify discrete forest stand types or ecological units to survey. The number of pre-harvest survey plots to establish is determined by the size of the block to be surveyed (Table 1).

Table 1. Minimum number of pre-harvest plots to be established.

Size of Strata	≤ 5 hectares	6 - 10 hectares	11 - 25 hectares	26 - 50 hectares	51 - 75 hectares	76 + hectares
No. of Plots	2	3	4	6	8	10

Establishing or exceeding the minimum number of plots is intended to adequately collect information on the majority of elements included in the pre-harvest survey. Due to the vastly different nature of the elements being surveyed the confidence of survey results may be better or poorer than desired for some elements.

In mixedwood forest stands with softwood understorey more plots per hectare may be required to provide sufficient confidence in survey results. In addition to establishing pre-harvest survey plots surveyors should investigate greater portions of the entire block.

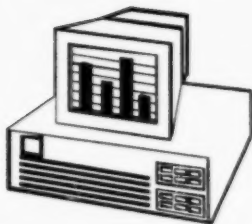
Pre-harvest survey methods proposed by each Forest Management Licencee will require the approval of Manitoba Conservation. Different survey design methods (fixed versus point sample, plot size, sample intensity) may be used if approved by Manitoba Conservation.

PRE-HARVEST SURVEY ELEMENTS

This section of the pre-harvest survey guidebook identifies the essential elements that information is collected on during a pre-harvest survey. The purpose of collecting information on each element is described and the specific items that must be collected during a pre-harvest survey are indicated. Whether data is to be collected only "at the pre-harvest survey plots", or "at and between plots" is also indicated. The information that must be presented for each proposed cut block in a block summary form is also shown. Block summary forms are required within Annual Operating Plans and for any proposed Annual Operating Plan amendments. Strategies to deal with specific concerns will be indicated on the block summary, however general strategies are indicated in Forest Management Plans.

The pre-harvest survey elements that follow include:

- Mensuration data
- Vegetation communities (V-Types)
- Soils
- Understorey trees
- Competitive plants
- Special concern, threatened and endangered species (SCTE)
- Forest health
- Wildlife evidence (Sign)
- Snags
- Geographic and physical features
- Heritage resources
- Forest and other resource values
- Waterways and wetlands



MENSURATION DATA

PURPOSE

The purpose of collecting mensuration data is to provide estimates of the volume and products (e.g. pulpwood, sawlogs) in blocks for company plans.

COMPONENTS OF PHS:

- Data to be collected at plots
- Use provincial species codes
- Record height measurements to the nearest 0.5 m
- Record tree ages

REQUIRED IN BLOCK SUMMARY FORM:

- Species composition based upon percent cover
- Average height of the canopy of each tree species
- Average age for each tree species
- Timber volumes (m^3/ha) for each tree species



VEGETATION COMMUNITIES (V-Types)

PURPOSE

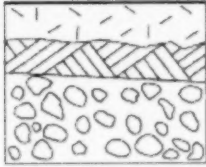
The purpose of collecting vegetation community information is to enable the classification of the vegetation community of a forest stand for potential forest management applications and treatments, and to assist in determining the appropriate forest renewal standard for the V-Type or block.

COMPONENTS OF PHS:

- Data will be collected at plots
- Use the Manitoba Forest Ecosystem Classification System for Manitoba (1995) (F.E.C.)
- The location of plots will be mapped in some form (Geographic Information Systems, paper maps, photos)
- The V-Type for each plot will be determined

REQUIRED IN BLOCK SUMMARY FORM:

- V-Type information will be summarized for the block
- V-Types are to be listed in descending order from the most to the least frequently encountered
- Estimate the percent area of the proposed block occupied by each V-Type
- An indication of the appropriate renewal objective for the whole, or parts of the block



SOILS

PURPOSE

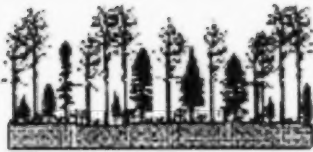
The purpose of collecting soils information is to incorporate data on erosion and/or rutting potential into the planning, implementation and scheduling of harvest and renewal activities. Soils information is also used to help determine soil productivity and species suitability for forest renewal.

COMPONENTS OF PHS:

- Data will be collected at plots focusing primarily on surface soils most affected by operations
- Identify risks of excessive site disturbance
- General soil descriptions will be based on surface soil moisture, texture classes, organic horizon depth and coarse fragment percent
- Map location of PHS plots at which soils have been examined
- It is recommended that surface soils be examined at every V-Type change

REQUIRED IN BLOCK SUMMARY FORM:

- V-Types and the soil types related to them should be reported together
- List the soil types that are important operationally



UNDERSTOREY TREES

PURPOSE

The purpose of collecting understorey information is to identify acceptable softwood advanced regeneration and potential hardwood competition so that the appropriate softwood understorey protection measures may be prescribed, consistent with the "Protection of softwood understorey in mixedwood and hardwood forests" guidebook for Manitoba.

COMPONENTS OF PHS:

- Data will be collected at plots
- All tree species will be recorded
- Height classes:
 - < 3 m
 - 3 m to < 6 m
 - 6 m to < 10 m
 - 10 m to $\leq$ 15 m
- The number of stems per hectare in each height class will be calculated
- Windfirmness of understorey in the 6 m to < 10 m and 10 m to $\leq$ 15 m classes will be calculated
- Leaf-off aerial photography may be used to supplement plot information for mixedwood blocks

REQUIRED IN BLOCK SUMMARY FORM:

- Stems per hectare for each understorey tree species
- Stems per hectare in each height class
- A description of the distribution of understorey trees throughout the proposed block
- Recommended Understorey Protection strategy (see "Protection of softwood understorey in mixedwood and hardwood forests" guidebook)



COMPETITIVE PLANTS

PURPOSE

The purpose of collecting competitive plant information is to estimate the potential competition for regenerating tree species, and identify potential opportunities to restrict "line of sight" in conjunction with other site features to protect wildlife and maintain wildlife habitat.

COMPONENTS OF PHS:

- Data will be collected at plots
- Record presence of competitive plants (alder, hazel, willow, rose, raspberry, mountain maple, thistle, grass and poplar potential)
- Map dense area of plants > 3 m in height that have the potential to restrict line of sight
- Percent cover and other measures are optional

REQUIRED IN BLOCK SUMMARY FORM:

- Indicate the presence of competitive plants and/or identify opportunities for plants to be retained for the purpose of restricting line of sight



SPECIAL CONCERN, THREATENED AND ENDANGERED SPECIES (SCTE)

PURPOSE

The purpose of identifying and collecting information on special concern, threatened and endangered (SCTE) species and habitat is to make managers aware of their presence so that they can be protected in compliance with Federal and Provincial Acts and Regulations.

COMPONENTS OF PHS:

- Data will be collected at and between plots
- Use the current list of animals and plants provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The list can be found on the Internet at: www.cosewic.gc.ca
- Use species defined as endangered by the Manitoba Endangered Species Act (MESA). Regularly consult with Manitoba Conservation Data Centre to update lists due to deletions or additions
- Photographs of SCTE are available on the Manitoba Conservation Data Center website: web2.gov.mb.ca/conservation/cdc/species/index.php
- Check COSEWIC list annually
- When SCTE are observed, identify their habitat

REQUIRED IN BLOCK SUMMARY FORM:

- Indicate presence of SCTE and their habitat
- Identify strategy to manage for SCTE
- Due to the sensitive nature of specific information, it will not be included in Annual Operating Plans but will be conveyed to the IRMT and incorporated during planning and treatment prescriptions

ACTION REQUIRED:

- If a special concern, threatened and endangered species or habitat are found notify:

Manitoba Conservation
Director Wildlife and Ecosystems Protection Branch
200 Saulteaux Crescent
Winnipeg, MB R3J 3W3
Phone 204-945-7743 or fax 204-945-3077



FOREST HEALTH

Purpose

The purpose of collecting forest health information is to identify forest diseases and insects that have the potential to affect future forest growth. Diseases and insects may be of interest throughout the province or only in a specific region. Operational harvesting or renewal treatments will be considered in the development of management strategies to address site-specific forest health concerns.

DISEASES AND INSECTS OF CONCERN:

- Jack Pine Dwarf Mistletoe, Spruce Dwarf Mistletoe, Western Gall Rust, Hypoxylon Canker, Hardwood Stem Decay, Stem Cankers of Conifers, Brown Cubical Rot, White Pocket Rot, Armillaria Root Disease, Yellow Stringy Rot, Spruce and Jack Pine Budworm, Poplar Wood Borer, Root Collar Weevils

COMPONENTS OF PHS:

- Data is collected at and between plots
- Record specific disease or insect species at each plot and/or between plots
- Record general forest health rating for each forest disease and insect
- Map locations of Dwarf Mistletoe and root disease infection centers

REQUIRED IN BLOCK SUMMARY FORM:

- Confirmed forest health concerns (by disease/insect and hazard rating) as provided by the province
- General forest health rating
- Prescription and mitigation required if harvest plan affected

Forest health concerns, arising from the PHS, that are deemed to be of a significant nature by the forest licence holder and/or Manitoba Conservation, may be assessed by Manitoba Conservation, and the appropriate pest management recommendations will be made. For more information, including data collection procedures, refer to the document: "The Forest Health Requirements For Pre-Harvest Assessment Guidelines", Manitoba Conservation, Forestry Branch, For. Health and Ecology, Revised July 2002.



WILDLIFE EVIDENCE (Sign)

PURPOSE

The purpose of collecting wildlife evidence is to document the presence of wildlife and wildlife habitat utilization that may require attention during planning and operations.

COMPONENTS OF PHS:

- Data will be collected at and between plots
- Collect and map where appropriate the location of:
 - Mineral licks
 - Colonial nesting sites
 - Big game antler sheds indicating season of habitat use
 - High use wildlife travel corridors
 - Stick nests (e.g. eagle, osprey and owl nests)
 - Cavity nests
 - Scat data should be collected for caribou, elk, moose, wolf and black bear on plots. As well information on whether the scat is a winter or summer scat should be collected for moose, elk, and caribou.

REQUIRED IN BLOCK SUMMARY FORM:

- Due to the sensitive nature of this information it will not be included in Annual Operating Plans but will be conveyed to the IRMT and incorporated during planning and treatment prescriptions.



SNAGS

PURPOSE

The purpose of collecting snag information is to identify the number of snags present in the block. This information will help determine the choice of harvest equipment, (safety concerns) and the potential to provide wildlife habitat.

COMPONENTS OF PHS:

- Data will be collected at plots
- Record number of snags per hectare by diameter class and species
- Map concentrations of snags within the proposed block

REQUIRED IN BLOCK SUMMARY FORM:

- Calculate the number of hardwood and softwood snags per hectare



GEOGRAPHIC AND PHYSICAL FEATURES

PURPOSE

The purpose of collecting geographic and physical feature information is to provide information for the planning of harvest and renewal prescriptions. This information is used to prescribe the appropriate harvest season, equipment and buffers for each block and will identify where line of sight may be a significant concern.

COMPONENTS OF PHS:

- Collect appropriate information between plots and at plots
- Map: slope, topography, sink holes, non-operable areas, regeneration and other significant features

REQUIRED IN BLOCK SUMMARY FORM:

- Record presence of sinkholes and other significant features
- Map areas to be avoided



HERITAGE RESOURCES

PURPOSE

The purpose of collecting heritage resource information is to document their presence so they can be protected during the planning and implementation of harvest and renewal activities.

COMPONENTS OF PHS:

- Training in the identification of culture and heritage resources will be used to help recognize potential indications of heritage resources such as graves, tools, artifacts, petroglyphs, pictographs, thunderbird nests, chert, and soapstone
- Map and record all evidence of potential heritage resources between or at PHS plots

REQUIRED IN BLOCK SUMMARY FORM:

- Due to the sensitive nature of this information it will not be included on block summary forms in Annual Operating Plans but will be conveyed to the IRMT and incorporated during planning, and treatment prescriptions

ACTION REQUIRED:

- Report findings of artifacts or heritage sites to:

Manitoba Historic Resources Branch,
Main Floor, 213 Notre Dame Ave.,
Wpg., Mb. R3B 1N3
Phone 1- 204-945-1830 or fax 204-945-2118

Further investigation by Manitoba Culture and Heritage to confirm significant heritage resources may be required. Significant heritage resources will require protection.



FOREST AND OTHER RESOURCE VALUES

PURPOSE

The purpose of collecting information on forest and other resource values is to identify features to consider during the planning and implementation of harvest and renewal activities.

COMPONENTS OF PHS:

- Map and record features encountered by the surveyor, at or between plots, such as: trap line activities, cabins, trails, baits, tree stands, claim posts, portages, fuel and boat caches, or research plots
- Identify exceptional trees, or plants, which may require protection or provide seed sources

REQUIRED IN BLOCK SUMMARY FORM:

- Map and record information also available to the planner such as: commercial/sport fisheries, Eco-tourism enterprises, canoe routes, recreational lakes, wild rice operations, and outfitter operating areas
- Annual Operating Plan maps will include designated and protected areas, proposed ecological reserves, and other proposed protected areas
- Indicate the mitigation prescribed to protect resource values
- Map and record all land use activities including and not limited to: cabins, trails, baits, tree stands, claim posts, portages, fuel and boat caches, and research plots (only to be used in discussion with the IRMT)



WATERWAYS AND WETLANDS

PURPOSE

The purpose of collecting waterways and wetlands information is to map and indicate the presence of previously unidentified waterways and wetlands.

COMPONENTS OF PHS:

- At and between plots, map and classify waterways such as: streams, intermittent streams, ephemeral drainage, and beaver floods
- Map and classify wetland features as marshes, fens, swamps, bogs, shallow open water, or riparian zones
- PHS plots may be established in wetlands

REQUIRED IN BLOCK SUMMARY FORM:

- Record or map new or previously unknown waterways and wetlands in or adjacent to block
- Indicate the mitigation strategy to protect waterways and wetlands in and adjacent to the block

GLOSSARY

Annual Operating Plans (AOP) – Plans prepared and submitted annually by timber operators describing how, where and when to develop roads, harvest timber, and complete renewal of the forest. AOP's describe the integration of operations with other resource users, the mitigation of the impacts of logging, the reclamation of disturbed sites, and the reforestation of harvested areas.

Antler sheds – Antlers that have been shed by ungulates (deer, moose, elk, caribou). When they are dropped naturally they are referred to as cast antlers or sheds.

Advanced regeneration – The young tree growing under an existing stand before it is logged. If advanced regeneration survives the logging operation it may form an initial part of the new stand.

Bog – A wetland ecosystem made up of in-situ accumulations of peat, either moderately or only slightly decomposed, derived primarily from sphagnum moss. Bog water is acidic, usually at or very near the surface, and unaffected by the nutrient-rich groundwater found in the adjacent mineral soils. Vegetative cover is typically dominated by ericaceous shrubs, sedges, and peat moss, but trees may also be present.

Block – Area in which the Pre-Harvest survey is performed for forest management activities (FPC –2001).

Buffer – A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a trail could block views that may be undesirable. Buffers may be set aside next to wildlife habitat to reduce abrupt change to the habitat.

Chert – A rock resembling flint and consisting essentially of fine crystalline quartz or fibrous chalcedony. Used by aboriginal people to make arrowheads, axes, etc.

Colonial nesting sites – A location where selected species of birds nest in colonies either on the ground or in trees, e.g. pelicans nest in colonies on the ground and blue herons nest in colonies in trees.

Cut Block - An area defined on the ground and planned for harvest, usually in one season.

Environment Act Licence - A licence to operate a development (as defined in *The Environment Act*), issued to the proponent of the development by the Director responsible for the Environment Act, with such specifications, limits, terms and conditions as the Director deems necessary to ensure effective environmental management of the development.

Ephemeral drainage – Drainage that flows briefly only in direct response to precipitation in the immediate locality and whose channel is at all times above the water table.

Fen – A landscape of low-lying peat land, made up of partly to well-decomposed sedge (occasionally moss) materials, where the water is at or near the surface and fed by relatively fast-moving, nutrient-rich groundwater that is usually neutral or alkaline, and rich in calcium.

Forest Management Licencees (FML) – Forest companies that have agreements with the Province of Manitoba in regards to the management of their licenced areas.

Forest Practices: Activities that are conducted in the forest during all stages of forest management operations (e.g. surveys, harvesting, road construction, silviculture).

Forest renewal prescription – A detailed plan for returning a harvested area to productive forest.

Geographic Information Systems (GIS) – A computer-based tool for mapping and analyzing events and objects on the landscape.

Guidebook: A collection of policies, guidelines, procedures and standards related to a specific Forest Practice.

Guideline: A guideline presents alternative procedures or standards that practices may incorporate to satisfy the principle upon which the guideline is based. To be enforceable a specific guideline must be stated on a Work Permit.

Heritage resource – Anything of archaeological or historic significance.

IRMT – Integrated Resource Management Teams, consisting of Manitoba government regional resource staff.

Intermittent streams - A stream in contact with the groundwater table that flows only at certain times of the year, such as when groundwater table is high and/or when it receives water from springs or from some surface source such as melting snow. It ceases to flow above the streambed when losses from evaporation or seepage exceed the available stream flow.

Line of sight – The distance that can be seen until the view is obstructed. The obstruction can be vegetation or topography.

Manitoba Forest Ecosystem Classification System (FEC) – A system for classifying the commercial forest areas of Manitoba. The system consists of 33 vegetation types and 22 soil types, which are identified using keys.

Marsh – An area of low-lying land, poorly drained, periodically or permanently inundated with standing or slow moving, nutrient-rich water, and subject to seasonal fluctuations. Marshes usually have mineral soil base.

Mineral licks – Terrestrial sites used by big game animals as a source for essential minerals which includes both macro and trace elements.

Mitigation – Actions taken during the planning, design, construction and operation of works and undertakings to alleviate potential adverse effects on the land base.

Non-operable areas – Areas within the operating area where the physical features of the landscape makes timber harvesting inappropriate.

Other related values - All forest related values that are not derived from timber harvesting and the subsequent production of forest products.

Petroglyphs – Rock carvings (carved into large rock masses) created by native peoples to represent ideas, events or activities.

Pictograph – A number of different techniques used by Native peoples to visually represent ideas, events or activities (e.g. rock paintings).

Policy: Policy in this document refers to governing principles and corresponding procedures and standards of the Provincial government.

Procedures: Steps taken to implement a policy or guideline.

Regeneration – The renewal of a forest or stand of trees by natural or artificial means, or the stand of young trees under 1.3 metres high that results. Advanced regeneration refers to regeneration that is established before the existing forest stand is removed.

Riparian zone – An area adjacent to streams, lakes and wetlands that is wet enough or inundated frequently enough to develop and support a natural vegetative cover distinct from the vegetation in neighbouring freely drained upland sites.

Rutting potential – Refers to the susceptibility of an area to be damaged by the repeat passage of machinery.

Sink holes – A funnel-shaped depression in the land surface that communicates with a subterranean passage developed by solution. It is common in limestone and karst regions.

Slope – The angle at which a planar surface is inclined relative to the horizontal.

Snags – Any standing dead, partially dead, or defective tree at least 3 meters tall.

Soapstone – A soft stone having a soapy feel and containing talc.

Special Concern, Threatened and Endangered Species (SCTE) - Classifications of the status of species populations as determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

- **Special Concern (SC)** – Indicates any indigenous species of fauna or flora that is particularly at risk because of low or declining numbers, occurring at the fringe of its range or in restricted areas, or for some other reason, but is not a threatened species.
- **Threatened (T)** – Indicates any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability do not become reversed.
- **Endangered (E)** – Indicates any indigenous species of fauna or flora that is threatened with imminent extirpation or extinction throughout all or a significant portion of its Canadian range.

Standards: Standards are established benchmarks that the implementation of a procedure can be measured against. They may be strict targets that must be achieved or exceeded, or they may be general goals against which implementation is measured.

Strata – A stand of trees with similar species composition, height, age, site, and crown closure. A strata may be one or more stands with similar characteristics.

Sustainable forest management – The management of forests to meet current needs without prejudice to their future productivity, ecological diversity or capacity for regeneration.

Swamp – A type of wetland where trees or tall shrubs dominate a landscape characterised by periodic flooding. Swamps have nearly permanent, subsurface, nutrient-rich water flow through the substrate of mineral sediments and organic materials; peat accumulations are seldom present.

Thunderbird nest – A spiritual site where aboriginal people have gone to seek visions. The site is usually constructed of rocks in a circle.

Understorey trees – The trees growing under the canopies of the other larger adjacent trees.

Vegetation types (V-Type) – The classification assigned to a forest stand using a dichotomous classification key. The key is primarily based on the presence and/or abundance of vegetative species. The vegetation type is used in the Manitoba Forest Ecosystem Classification System.

Windfirmness - An indication of the ability of the softwood understorey to withstand significant winds after the overstorey has been removed.

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